Changes “Other Than Inconsequential” Require These Additional Reviews:

Joint Review Group (JRG)

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for push mode core sampling using Core Sampling System (CSS) and associated support equipment.

1.2 Scope

This procedure is applicable to push mode core sampling with push mode bit in all Hanford Site Waste Tanks.

This procedure can be performed in multiple locations. A work area and/or location specific hazard analysis must be performed prior to starting the activity per TFC-ESHQ-S_SAF-C-02.

2.0 INFORMATION

2.1 Terms and Definitions

- COC  Chain Of Custody
- CSS  Core Sampling System
- DA   Drill String Adapter
- DRI  Direct Reading Instrument
- DS   Drill String
- OTC  Onsite Transfer Cask
- QR   Quill Rod
- RLU  Remote Latch Unit
- SR   Shielded Receiver
- TSAP Tank Sampling and Analysis Plan.
2.2 General Information

2.2.1 Sections 5.11, Remove Sampler from Cask, and 5.12, Insert Sampler into Drill String, are not performed when taking the first segment.

2.2.2 Specific steps and/or sections of this procedure may be performed by a certified operator in any order needed to support maintenance activities when equipment is not physically attached to a tank. When performing maintenance inside the boundaries of tank farms all steps subject to tank farm control must be followed (i.e., dome loading controls must be observed at all times when working inside a tank farm; flammable gas monitoring and ignition source controls must be followed when working in any tank intrusive region).

2.2.3 Specific steps and/or sections of this procedure may be performed as needed to support training when equipment is not attached to a tank, or when the operation will not impact any tank intrusive zones. When training is conducted with equipment physically attached to a tank, or the operation will impact tank intrusive zones, steps must be followed as written in this procedure.

2.2.4 A hazard assessment was completed on Lithium Bromide (LiBr) 0.3 M aqueous solution that determined the required PPE is covered under the GHA for chemicals use.

2.2.5 Ignition source control requirements (e.g., bonding and grounding) are always applicable to 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-103, and are also applicable inside waste intruding equipment and Waste Group B Tank headspace under special conditions. See specific Ignition Source Control Requirements Screening prepared by engineering for further information. (SAC 5.8.2, AC 5.9.2)

2.2.6 Emergency response actions during core sampling shall be communicated through the FWS.

2.2.7 RLU s have individual release times and are determined by actual use in the sampling process. Some RLU s release within 60 seconds and some take more than two minutes.

2.2.8 Cycling of the SR Ball Valve is performed as determined by the Control Operator as a best RadCon practice to limit buildup of waste on the SR Ball Valve.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

**WARNING** - Failure to don appropriate PPE prior to connecting or disconnecting lines with solutions of more than 110°F may result in personnel injury.

3.1.1 Use appropriate personnel protection equipment and extreme care when handling hot water to prevent scald injuries.

3.1.2 The spray wash assembly has thermally hot components and liquids; special attention should be given to avoid contact with hot piping, hoses and liquids.

3.1.3 Minimum required respiratory protection and voluntary upgrade is identified using one of the following:
- Farm specific TVIS
- Respiratory Protection Form.

3.1.4 Hearing protection required when working within 5 feet of an operating RadCon high volume sampler, 5 feet of the core sampler generator or when working near an operating crane (30 feet rear & 15 feet sides).

3.1.4.1 Hearing Protection controls may be increased or decreased based on monitoring results during work activities with direction from IH.

3.1.5 Negative pressure must be confirmed on actively-ventilated tanks when the riser is opened (e.g., masslin cloth or audio confirmation). Failure to confirm negative pressure may expose workers to tank vapors.

3.1.6 Industrial hygiene monitoring shall be performed in accordance with applicable Industrial Hygiene Sample Plan.

3.1.7 Rotating or moving equipment exists at various points during the performance of this procedure.

3.1.8 Nitrile/latex gloves are required when working with Aerokroil.
3.2 Equipment Safety

3.2.1 For mobile crane set-up, outrigger pads shall be sized as required by RPP-CALC-56716, “Soil Bearing Capacity for Crane Loads.”.

3.3 Radiation and Contamination Control

3.3.1 All core sampling equipment is potentially contaminated and should be handled with caution to avoid spread of contamination.

NOTE - The camlock caps on the Quill Rod and Shielded Receiver serve as drip catch containments during disconnection/attachment/mating activities. (ALARACT 02.3)

3.3.2 A minimum of one contamination control method is required when performing breaches of contaminated systems: Drip Pan, Ground Cover, Drape, Absorbent, Damp Rag, Bagging, Sleevings, and Glove Bag.

3.3.3 Work in radiological areas will be performed using a Radiological Work Permit following review by Radiological Control per the ALARA work planning procedure TFC-ESHQ-RP_RWP-C-03. (ALARACT 02.3)

3.3.4 HCA controls required whenever breaching known or potentially contaminated systems/components.

NOTE - A riser is considered to be “not open” if a barrier (e.g. sealed sleeving, certified glove bag, breather filter, etc.) exists between tank head space and the environment.

3.3.5 Airborne Radioactivity Area (ARA) posting and respiratory protection are required when a riser is open to tank head space unless the tank is actively ventilated, or when required by RWP.
3.3 Radiation and Contamination Control (Cont.)

3.3.6 High Radiation areas will be controlled per TFC-ESHQ-RP_MON-C-11.

3.3.6.1 If a newly established High Radiation Area is to be left unattended, completion of the WRPS High Radiation Area Establishment Checklist (Site Form A-6005-915) is required prior to the area being left unattended.

3.3.7 Radiation shielding will be applied per TFC-ESHQ-RP_MON-C-12.

3.3.8 HPT dose rate survey required whenever raising sample material or sampling equipment.

3.3.9 HPT contamination survey required whenever breaching known or potentially contaminated systems/components.

3.3.10 Work area shall be posted as a High Radiation Area (HRA) when obtaining samples.

3.3.11 Radiological areas may be DOWN-POSTED based on HPT survey results. These areas will be re-posted and adjusted as conditions and work activities require.

3.3.12 Work area shall be posted as a Contamination Area (CA) for all work when working on contaminated systems on the CSS.

3.3.12.1 Ground Cover is required when performing work on contaminated components of the CSS in a CA.

3.3.13 The HPT will establish low dose standby waiting areas for personnel not directly involved in all work activities in high exposure fields. All personnel will be directed by the FWS to move to standby areas when they are not actively needed to support individual tasks in high exposure rate fields.

3.3.14 Fixative may be applied at any time to aid in contamination control.
3.4 Environmental Compliance

3.4.1 Immediately report any spills or releases to Environmental per the Environmental On-Call List in accordance with procedure TFC-ESHQ-ENV_FS-C-01. This includes any water discharge to surface contamination areas.

3.4.2 In accordance with TFC-ESHQ-ENV_RM-C-04, “Water Discharge in Tank Farms”, routine maintenance and operation activities may result in small incidental discharge of raw water as long as the below listed limits and conditions are met. (ref. TFC-ESHQ-ENV_RM-C-04, Table 2, Water Discharge at Tank Farms for the listing of approved incidental discharges):

- No discharge from a single activity may exceed 60 gallons released to the soil
- Appropriate best management practices (BMPs) shall be implemented to prevent unnecessary discharges.
- No ponding of liquid
- During pre-job planning, measures to limit soil erosion will be incorporated in the work plan
- During performance of the work, all measures to limit ponding and/or erosion will be implemented.

3.4.3 Minimize open riser time using valves, caps, adapters, or plugs as appropriate.

3.4.4 Ensure risers, pits and other openings into the tank are covered whenever left unattended.

3.4.5 Equipment is decontaminated or contained when removed from tanks.

3.4.5.1 Equipment is decontaminated or contained when removed from tanks when >50,000 dpm/100 cm² beta/gamma and/or >70 dpm/100 cm² alpha.

3.4.5.2 Swipes will be taken to determine that the surface of the item or the outermost surface of the container are maintained <50,000 dpm/100 cm² beta/gamma and/or <70 dpm/100 cm² alpha.

3.4.5.3 Containments used during the work must be in accordance with TFC-ESHQ-RP_RWP-C-02 latest revision, Attachment A, Containment Selection Guide. (ALARACT 02.3)
3.4 Environmental Compliance (Cont.)

3.4.6 If sustained wind speeds are >25mph, then do not initiate sampling. (ALARACT 02.3)

3.4.6.1 A local wind speed measurement device may be used in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. (ALARACT 02.3)

3.4.6.2 Use of a local device and the measured wind speed readings taken from it must be documented in the Work Management System Work Record.

3.4.7 Pre-job and Post-job surveys are required.

3.4.8 Purge air must be maintained < 10 cfm when sampling a tank without an operating exhauster.

3.4.9 Report work space air samples to WRPS Environmental Protection and appropriate WRPS Shift Office for grab air samples equal to or greater than 10 DAC within the work space AND/OR contamination found during post job radiological surveillance of the posted and controlled radiological boundary area boundary that exceeds the Radiological Work Plan (RWP).
3.5 **Limits**

ALARACT 02.3, Tank Farm ALARACT Demonstration for Low Purge Gas Core Sampling

HNF-SD-WM-TSR-006 Tank Farms Technical Safety Requirements

AC 5.7  Waste Leak Evaluation Program

AC 5.9.2  Ignition Controls

SAC 5.8.2  Flammable Gas Controls
4.0 **PREREQUISITES**

4.1 **Special Tools, Equipment, and Supplies**

The following supplies may be needed to perform this procedure:

- DS O-rings
- Review of GHS-SDS and/or MSDS for LiBr 0.3 M solution
- Review of GHS-SDS and/or MSDS for Quick-N-Brite cleaner
- Review of GHS-SDS and/or MSDS for Pipe Joint Compound
- Aerokroil
- 400 ml. of deionized water
- Chain-Of-Custody Record For Core Sampling
- Tags, Waste Tank Sample Seal
- Calibrated Torque Wrench
- Hearing Protection
- Nitrile/latex gloves
- Two Eyewash Stations with drench hoses
- LiBr 0.3 M solution
- TOC Containment Certification Card (Site Form BT-6005-999)
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.
4.2 Performance Documents

The following documents may be needed to perform this procedure:

TO-020-451, Setup and Takedown of Core Sample Systems
TO-020-466, Spray Washer Equipment Operation
TO-040-540, Water Surveillance and Usage
TO-080-090, Transport the Onsite Transfer Cask
TO-080-820 Perform Field Inspection and Loading of Onside Transfer Casks
TO-100-010, Waste Container Operations
TO-100-052, Perform Waste Generation, Segregation, Accumulation and Clean-up
2-MISC-049, Bolt Torqueing Guidelines
RCD-NE-PRC-RT3, Radiography Safe Operating (ORANO)
  • Site Form A-6005-436, Generator Initial Start-Up Checklist
  • Site Form A-6005-437, Hanford Site Generator Restart-Up Checklist
  • RPP-CALC-56716, Soil Bearing Capacity for Crane Loads

4.3 Field Preparation

4.3.1 ENSURE a work area and/or a location specific hazards analysis has been performed per TFC-ESHQ-S-SAF-C-02.

4.3.2 COMPLETE appropriate sections of the following:
  • Checklist 1
  • Data Sheet 1.

4.3.3 CONFIRM hoist box vent filters are installed (RPP-STE-00080). (SAC 5.8.2)
5.0 PROCEDURE

5.1 Operate Generator

NOTE - The following steps may be performed at any time during the performance of this procedure and may be repeated as necessary.

5.1.1 IF directed by the FWS, START generator per Generator Initial Start-Up Checklist and per vendor instructions.

5.1.2 IF directed by the FWS, RESTART generator per Hanford Site Generator Restart-Up Checklist and per vendor instructions.

5.1.3 IF directed by the FWS, SHUTDOWN generator per vendor instructions.

Special Instruction

Negative pressure must be confirmed on actively-ventilated tanks when the riser is opened (e.g., masslin cloth or audio confirmation).

NOTE - Section 5.2 must be performed at the start of each Shift.

5.2 Complete Shift Prerequisites

5.2.1 AT start of each shift, FWS COMPLETE items on Checklist 2.

5.2.2 PERFORM Sections 5.3 through 5.13.

5.2.3 RESPOND to all alarms per Attachment 2 - Core Sampling System Alarm Response.
5.3 Install Drill String

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

5.3.1 ENSURE sample/sampler serial number for first sample has been recorded on Data Sheet 3.

5.3.2 IF first sample, N/A Steps 5.12.4 and 5.12.7 on Data Sheet 3.

5.3.3 PERFORM the following to confirm torqueing:

5.3.3.1 RECORD torque wrench calibration information on Checklist 1.

5.3.3.2 SET torque wrench to setting indicated on lifting bail (+25% - 0%)

OR

IF no torque indication is on lifting bail, SET value of 28-35 ft-lbs (+25% -0%).

5.3.3.3 ENSURE mounting screw on lifting bail has been torqued within designated limits.

5.3.3.4 SIGN AND DATE Checklist 1.

5.3.4 FWS CONFIRM Drill Bit, Core Barrel, QR adapter and DS are the same as identified on DS calculation sheet from TO-020-451 AND SIGN AND DATE Checklist 1.

5.3.5 PERFORM independent check of Step 5.3.4 AND SIGN AND DATE Checklist 1.

5.3.6 ENSURE Core Sampler Drill String Seal (Frisbee Seal) is in place.

5.3.7 ENSURE Checklist 1 has been completed.
5.3 **Install Drill String (Cont.)**

**NOTE** - Steps 5.3.8 through 5.3.11 may be performed and repeated at any time throughout this procedure.

5.3.8 **ENSURE** foot clamp is closed and locking collar is installed on DS when DS is not connected to crane with lifting bail/QR/SR.

5.3.9 **WHEN** bit is below waste surface, IHT **PERFORM** Flammable and Tank Vapor survey in accordance with IHSP.

5.3.10 **WHEN** bit is below waste surface **AND**

**WHEN** the DS has been capped/sealed, **PERFORM** the following prior to opening the DS: *(Sac 5.8.2)*

5.3.10.1 **MONITOR** for flammable gases inside DS.

5.3.10.2 **IF** the flammable gas concentration is > 25% of the LFL, **DISCONNECT** the DS in a slow and deliberate manner.

5.3.10.3 **COVER** the open DS with a damp rag.

5.3.10.4 **MONITOR** for flammable gases inside DS **AND**

**CONFIRM** flammable gas concentration is ≤ 25% of the LFL before continuing.

5.3.11 **PREPARE** OTC per TO-080-820.

5.3.12 **ENSURE** sampler is installed in core barrel.

**NOTE** - Steps 5.3.13 through 5.3.15 are performed concurrently.

5.3.13 **USE** a lifting bail **AND**

**INSTALL** DS in numerical order. *(Ac 5.9.2)*

5.3.14 **ENSURE** at least one of the following items is installed on the DS:

- DA
- Lifting Bail.

5.3.15 **IF** requested by Engineering, **USE** DS as zip cord probe to determine when waste is contacted **AND**

**PLACE** reference mark on DS when waste is contacted.
5.4 Prepare for Core Sampling

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently and/or concurrently or any logical order.

5.4.1 ENSURE sample/sampler data has been recorded on Data Sheet 3 for this sample.

5.4.2 IHT PERFORM Flammable and Tank Vapor survey in accordance with IHSP. (AC 5.9.2)

5.4.3 WHEN the DS has been capped/sealed, PERFORM the following prior to opening the DS: (SAC 5.8.2)

5.4.3.1 MONITOR for flammable gases inside DS.

5.4.3.2 IF the flammable gas concentration is > 25% of the LFL, DISCONNECT the DS in a slow and deliberate manner.

5.4.3.3 COVER the open DS with a damp rag.

5.4.3.4 MONITOR for flammable gases inside DS AND CONFIRM flammable gas concentration is ≤ 25% of the LFL before continuing.

5.4.4 REMOVE lifting bail or DA from DS as necessary to install new DS segment.

5.4.5 ENSURE required 19" section of DS or other length of DS section as documented on TO-020-451 Data Sheet 2 has been installed for this segment.

5.4.6 ENSURE DA is installed on DS.

5.4.7 CONNECT QR to DA.

5.4.8 REMOVE locking collar from DS.

5.4.9 OPEN foot clamp.

5.4.10 IF taking first segment, OBTAIN expected grapple reading and expected length of first segment from Data Sheet 1.
5.5 Lower Grapple

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

5.5.1 POSITION HS-043 DRILL MODE to PUSH.

5.5.2 ADJUST HS-009 DRILL DOWN FORCE CONTROL to limit down force for this segment per Data Sheet 1.

5.5.3 POSITION rams for desired stroke.

5.5.4 RAISE grapple to pre-pintle release AND

RESET/ZERO grapple counter.

5.5.5 ATTACH grapple to Pintle Rod AND

RECORD grapple counter readout at slack cable on Data Sheet 3.

5.5.6 REMOVE slack in cable.
5.6 Perform Push Mode Sampling

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

- A partial segment (stroke length less than 19") may be obtained at any time at FWS direction.

5.6.1 BEGIN desired sample stroke.

5.6.2 WHEN sample stroke is completed, RECORD the following on Data Sheet 3:

- Down Force
- Stroke Length
- Initials and Penetration Rate.
5.7 Retrieve Pintle Rod from Drill String

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

5.7.1 OBSERVE load cell during pintle rod separation AND

RECORD the following on Data Sheet 3:
- time
- date
- shear values.

5.7.2 RETRIEVE Pintle Rod.

5.7.3 RAISE DS if required by TSAP.

5.7.4 CLOSE foot clamp.

5.7.5 INSTALL locking collar on DS.

5.7.6 DISCONNECT QR from DA.

5.7.7 ADD LiBr 0.3 M solution to DS as specified on Data Sheet 1.

5.7.8 DROP pintle rod into over pack.

5.7.9 IF Pintle Rod does not release, PERFORM the following:

5.7.9.1 INSTALL sleeving between overpack and QR.

5.7.9.2 Manually RELEASE Pintle Rod.

5.7.10 RECORD load cell reading for pintle drop on Data Sheet 3.
5.8 Recover Spent Sampler from Drill String

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

5.8.1 WHEN the DS has been capped/sealed, PERFORM the following prior to opening the DS: (sac 5.8.2)

5.8.1.1 MONITOR for flammable gases inside DS.

5.8.1.2 IF the flammable gas concentration is > 25% of the LFL, DISCONNECT the DS in a slow and deliberate manner.

5.8.1.3 COVER the open DS with a damp rag.

5.8.1.4 MONITOR for flammable gases inside DS AND CONFIRM flammable gas concentration is ≤ 25% of the LFL before continuing.

5.8.2 CONNECT SR to DA.

5.8.3 OPEN SR ball valve BV-010.

5.8.4 IF 1st segment, OBTAIN expected Remote Latch Unit (RLU) value from Data Sheet 1 AND RECORD obtained value on Data Sheet 3.

5.8.5 IF not first segment, CALCULATE AND RECORD expected RLU reading at bottom when unseating sample AND

IF 19” rod is added, USE Data Sheet 3 (Step 5.12.7 value + 19”) calculation.

5.8.6 RAISE RLU to full up position AND

RESET/ZERO RLU counter.

5.8.7 ATTACH RLU on to sampler AND

RECORD RLU counter readout at bottom of DS on Data Sheet 3.

5.8.8 POST HRA.
5.8 Recover Spent Sampler from Drill String (Cont.)

NOTE - Load-cell should read about 10 lbs greater with sampler attached.

5.8.9 RETRIEVE sample.

5.8.10 RECORD maximum load-cell reading (Max Force to Unseat) and time and date on Data Sheet 3.

5.8.11 OBTAIN contact dose rate through DS AND RECORD maximum values on Data Sheet 3.

5.8.12 RAISE sampler into SR.

5.8.13 CLOSE SR ball valve BV-010.

5.8.14 DISCONNECT SR from DA.
5.9 Perform X-Ray of Sample

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

- This section may be performed after retrieving the sampler from the DS or sample cask.

5.9.1 CONNECT SR to X-Ray machine.

5.9.2 OPEN SR ball valve BV-010.

NOTE - Step 5.9.3 and 5.9.4 are performed concurrently.

5.9.3 AS directed by X-Ray technician, LOWER sampler into X-Ray machine.

5.9.4 PERFORM imaging in accordance with applicable sections of RCD-NE-PRC-RT3.

5.9.5 AFTER imaging is complete, RAISE sampler into SR.

5.9.6 CLOSE SR ball valve BV-010.

5.9.7 DISCONNECT SR from X-Ray machine.

5.9.8 FWS RECORD X-Ray results on COC.
5.10 Load Sampler into Cask

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

5.10.1 CONNECT SR to cask.
5.10.2 OPEN SR ball valve BV-010.
5.10.3 DEPOSIT sampler into cask.
5.10.4 IF RLU does not release sampler, PERFORM the following:
   5.10.4.1 POST area as HRA.
   5.10.4.2 INSTALL sleeving between OTC and SR.
   5.10.4.3 Manually RELEASE sampler.
5.10.5 RAISE RLU into SR.
5.10.6 CLOSE SR ball valve BV-010.
5.10.7 DISCONNECT SR from cask.
5.10.8 IF last sampler has just been deposited in cask, PROCEED to Section 5.13 to recover DS.
5.11 Remove Sampler from Cask

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.

- This section is not performed if taking the first segment.

5.11.1 IF directed by FWS, HAND LOAD sampler AND

GO TO Section 5.12.

5.11.2 CONNECT SR to cask.

5.11.3 OPEN SR ball valve BV-010.

5.11.4 REMOVE sampler from cask.

5.11.5 CLOSE SR ball valve BV-010.

5.11.6 DISCONNECT SR from cask.
5.12 Insert Sampler into Drill String

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently concurrently or any logical order.
- This section is not performed if taking the first segment.

5.12.1 WHEN the DS has been capped/sealed, PERFORM the following prior to opening the DS: (SAC 5.8.2)

5.12.1.1 MONITOR for flammable gases inside DS.

5.12.1.2 IF the flammable gas concentration is > 25% of the LFL, DISCONNECT the DS in a slow and deliberate manner.

5.12.1.3 COVER the open DS with a damp rag.

5.12.1.4 MONITOR for flammable gases inside DS AND CONFIRM flammable gas concentration is \( \leq 25\% \) of the LFL before continuing.

5.12.2 CONNECT SR to DA.

5.12.3 OPEN SR ball valve BV-010.

5.12.4 RECORD expected RLU reading AT BOTTOM on Data Sheet 3 by copying value recorded in Step 5.8.7 for previous segment.

5.12.5 RAISE RLU to full up position AND RESET/ZERO RLU counter.

5.12.6 LOWER RLU and sampler AND SEAT the sampler in DS.

5.12.7 RECORD RLU reading at bottom of DS on Data Sheet 3.

NOTE - The following step may be repeated as many times as the FWS directs.

5.12.8 CHECK electrical counter value is within 0.6 inches of expected value AND IF is not within 0.6 inches, ATTEMPT to reseat sampler.

5.12.9 IF the sampler cannot be reseated, GO TO Section 5.14.
5.12 Insert Sampler into Drill String (Cont.)

5.12.10 RAISE RLU into SR.

5.12.11 CLOSE SR ball valve BV-010.

5.12.12 DISCONNECT SR from DA.

5.12.13 GO TO Section 5.4
5.13 Wash and Recover Drill String

NOTE - As field conditions dictate Sections 5.3 through 5.13 may be performed independently, concurrently, or any logical order.

- Steps 5.13.1 through 5.13.5 are performed continuously throughout this section.

5.13.1 ENSURE a sampler is not seated in core barrel.

WARNING

Failure to don appropriate PPE prior to connecting or disconnecting lines with solutions of more than 110°F may result in personnel injury.

5.13.2 IF solution temperature is greater than 110°, DON rubber gloves, long sleeves and face shield.

5.13.3 IHT PERFORM flammable and Tank Vapor survey in accordance with IHSP.

5.13.4 PERFORM the following prior to opening the DS: (SAC 5.8.2)

5.13.4.1 MONITOR for flammable gases inside DS.

5.13.4.2 IF the flammable gas concentration is > 25% of the LFL, DISCONNECT the DS in a slow and deliberate manner.

5.13.4.3 COVER the open DS with a damp rag.

5.13.4.4 MONITOR for flammable gases inside DS AND

CONFIRM flammable gas concentration is ≤ 25% of the LFL before continuing.
5.13 Wash and Recover Drill String (Cont.)

5.13.5 ENSURE TO-040-540, Data Sheet 1, has been prepared.

5.13.6 ENSURE DA has been removed from DS.

5.13.7 ENSURE DS tophat is installed on footclamp.

5.13.8 IF more DS is required to accommodate sleeving installation, INSTALL approximately 2 ft of DS.

5.13.9 ENSURE sleeving has been installed on DS.

5.13.10 INSTALL lifting bail on DS.

5.13.11 ENSURE drape with absorbent is installed.

5.13.12 ENSURE area is posted as HRA.

5.13.13 CONNECT crane to lifting bail.

5.13.14 REMOVE locking collar from DS.

5.13.15 SEAL sleeving to lifting bail.

5.13.16 OPEN foot clamp.
5.13 Wash and Recover Drill String (Cont.)

5.13.17 REMOVE DS into sleeving in < 35ft sections as follows:

5.13.17.1 OPERATE decontamination system during DS removal per TO-020-466.

5.13.17.2 RAISE DS.

5.13.17.3 TURN DS spray washer off.

5.13.17.4 ENSURE foot clamp is closed.

5.13.17.5 CONTROL disconnection area as an HCA.

5.13.17.6 CUT AND SEPARATE sleeving.
   a. WHILE separating sleeving, USE damp rag for contamination control.
   b. HPT PERFORM contamination survey of newly exposed area.
   c. PERFORM decontamination as needed to ensure removable contamination is < 50,000 dpm/100cm$^2$ beta-gamma and < 70 dpm/100cm$^2$ alpha.

5.13.17.7 INSTALL locking collar onto DS below separation point.

5.13.17.8 SEPARATE DS sections.

5.13.17.9 SEAL sleeving below removed section of drill string.

5.13.18 UNTIL DS is above the waste surface, REPEAT Step 5.13.2 through Step 5.13.17.

5.13.19 ENSURE LiBr 0.3 M solution has drained from DS.

5.13.20 INSTALL DA on DS.

5.13.21 CONNECT QR to DA.

5.13.22 LOWER grapple near bottom of DS.
5.13 Wash and Recover Drill String (Cont.)

NOTE - See Data Sheet 1 for approximate Sample/Grapple wash volume.

5.13.23 **WASH** out Grapple Hoist box per TO-020-466.

5.13.24 **WINTERIZE** grapple hoist box as follows:

NOTE - Limiting supply pressure to approximately 35 psi will maintain purge air to < 10 cfm.

5.13.24.1 **ENSURE** supply pressure is approximately 35 psi on purge air.

5.13.24.2 **ENSURE** Nucfil is removed.

5.13.24.3 **ENSURE** spray washer supply filter canister is drained.

5.13.25 **RAISE** grapple into QR.

5.13.26 **DISCONNECT** QR from DA.

5.13.27 **ENSURE** wash water has drained from DS.

5.13.28 **CONNECT** SR to DA.

5.13.29 **OPEN** SR ball valve BV-010.

5.13.30 **LOWER** RLU near bottom of DS.

NOTE - See Data Sheet 1 for approximate Sample/Grapple wash volume.

5.13.31 **WASH** out Sample Hoist box per TO-020-466.

5.13.32 **WINTERIZE** sample hoist box as follows:

NOTE - Limiting supply pressure to approximately 35 psi will maintain purge air to < 10 cfm.

5.13.32.1 **ENSURE** supply pressure is approximately 35 psi on purge air.

5.13.32.2 **ENSURE** Nucfil is removed.

5.13.32.3 **ENSURE** spray washer supply filter canister is drained.
5.13 Wash and Recover Drill String (Cont.)

5.13.33 RAISE RLU into SR.

5.13.34 CLOSE SR ball valve BV-010.

5.13.35 DISCONNECT SR from DA.

5.13.36 ENSURE wash water has drained from DS.

5.13.37 REMOVE DA.

5.13.38 ENSURE sleeving and lifting bail are installed on DS.

5.13.39 CONNECT crane to lifting bail.

5.13.40 REMOVE locking collar from DS.

5.13.41 SEAL sleeving to lifting bail.

5.13.42 ENSURE airline is installed to foot clamp **AND**

   ENSURE supply air pressure is set to approximately 110 psi.

5.13.43 OPEN foot clamp.

5.13.44 REMOVE remaining DS in < 35 ft section as follows:

   5.13.44.1 OPERATE decontamination system during DS removal per TO-020-466.

   5.13.44.2 RAISE DS until core barrel is positioned in DS spray washer.

   5.13.44.3 TURN DS spray washer off.

   5.13.44.4 RAISE remaining DS into sleeving.
5.13 Wash and Recover Drill String (Cont.)

NOTE Step 5.13.45 may be performed out of order or concurrently with other steps.

5.13.45 PACKAGE DS per TO-100-052,

OR

INSTALL DS in glove bag.

5.13.45.1 ATTACH TOC Containment Certification Card (Site Form BT-6005-999) to glove bag.

(HP) HOLD POINT

5.13.45.2 PERFORM (Initial) certification of glove bag in accordance with certification checklist. (Included in work package) AND SIGN (Initial) certification hold point on Data Sheet 4.

5.13.45.3 IF glove bag needs to be re-certified due to re-configuration or damage, PERFORM the following:

a. IF required to support re-certification, PERFORM repair and decontamination.

b. PERFORM certification in accordance with the certification checklist AND SIGN additional hold points on Data Sheet 4.

5.13.45.4 DISASSEMBLE drill string in glove bag.

5.13.45.5 COLLAPSE glove bag and place for disposal per the Waste Planning Checklist.
5.13 Wash and Recover Drill String (Cont.)

5.13.46 REMOVE foot clamp.
   5.13.46.1 ENSURE drape with absorbent is installed below foot clamp.
   5.13.46.2 CONTROL drape as an HCA.
   5.13.46.3 UN-BLOT/REMOVE foot clamp into bagging with absorbent.

5.13.47 REPLACE Frisbee seal.
   5.13.47.1 ENSURE drape with absorbent is installed below Frisbee seal.
   5.13.47.2 CONTROL drape as an HCA.
   5.13.47.3 IF the Frisbee seal assembly has been removed from the riser,
          OR
          IF the tank is not actively ventilated, POST the work area as an ARA.
   5.13.47.4 UN-BOLT/REMOVE Frisbee seal cover.
   5.13.47.5 UN-BOLT/REMOVE old Frisbee seal into bagging.
   5.13.47.6 INSTALL new Frisbee seal.
   5.13.47.7 REMOVE drape at any time after termination of HCA controls.

5.13.48 ENSURE the following:
   • Quantity of water used has been recorded on TO-040-540, Data Sheet 1
   • Waste has been disposed of per TO-100-052.

5.13.49 ENSURE post-job radiological survey of work area AND
          RECORD radiological survey number.
5.14 Recover from Inability to Seat Sampler in Drill String

5.14.1 RAISE RLU with sampler into SR.

5.14.2 CLOSE SR ball valve BV-010.

5.14.3 DISCONNECT SR from DA.

5.14.4 WHEN the DS has been capped/sealed, **PERFORM** the following prior to opening the DS: *(SAC 5.8.2)*

5.14.4.1 **MONITOR** for flammable gases inside DS.

5.14.4.2 **IF** the flammable gas concentration is > 25% of the LFL, **DISCONNECT** the DS in a slow and deliberate manner.

5.14.4.3 **COVER** the open DS with a damp rag.

5.14.4.4 **MONITOR** for flammable gases inside DS AND **CONFIRM** flammable gas concentration is \(\leq 25\%\) of the LFL before continuing.

5.14.5 **INSTALL** slewing over 19” section.

5.14.6 **ATTACH** QR to DA.

5.14.7 **REMOVE** locking collar from DS.

5.14.8 **OPEN** Footclamp.

5.14.9 **ENSURE** drape with absorbent is installed.

5.14.10 **RAISE** Drill String 19 inches.

5.14.11 **CLOSE** Footclamp.

5.14.12 **INSTALL** locking collar from DS.

5.14.13 **DISCONNECT** QR from DA.

5.14.14 **REMOVE** DA from DS.

5.14.15 **REMOVE** 19” section within slewing.
5.14 Recover from Inability to Seat Sampler in Drill String (Cont.)

5.14.16 REPEAT 5.14.5 thru 5.14.15 until all 19” sections are removed or drill bit is above waste surface.

5.14.17 ENSURE TO-040-540, Data Sheet 1, has been prepared.

5.14.18 ADD a minimum of 6 liters and a maximum of 200 liters of hot wash water down DS.

5.14.19 GO TO Section 5.12.
5.15 Records

5.15.1 **PERFORM** the following for records identified within this procedure.

5.15.1.1 On the Records Submittal Checklist, **RECORD** the number of times the record was completed

**OR**

**PLACE** a check mark (✔) in the N/A column.

5.15.1.2 **ATTACH** the completed records to the Records Submittal Checklist **AND**

**SIGN** Records Submittal Checklist indicating the package is complete.

5.15.1.3 **SEND** the package to the Central Shift Office for records retention.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS), is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

<table>
<thead>
<tr>
<th>Records Submittal Checklist</th>
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<th>N/A (✔)</th>
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</thead>
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<tr>
<td><strong>Forms and Addenda</strong></td>
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<td></td>
</tr>
<tr>
<td>Chain of Custody</td>
<td></td>
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<tr>
<td>Checklist 1 – Prerequisite Conditions and Signoffs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checklist 2 – FWS Checklist</td>
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<tr>
<td>Data Sheet 1 – Core Sampling Information</td>
<td></td>
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<tr>
<td>Data Sheet 2 – Drill String Replacement</td>
<td></td>
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<tr>
<td>Data Sheet 3 – Sampling Data</td>
<td></td>
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<tr>
<td>Data Sheet 4 – Certification Hold Points</td>
<td></td>
<td></td>
</tr>
</tbody>
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________________________________________ / ______________________ / ________________
Signature                          Print (First and Last)                  Date
## Checklist 1 – Prerequisite Conditions and Signoffs

### Sheet 1 of 3

<table>
<thead>
<tr>
<th>Condition</th>
<th>Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VERIFY</strong> TSAP is completed.</td>
<td>FWS Signature</td>
</tr>
<tr>
<td><strong>VERIFY</strong> Waste Leak Path Evaluation applicable to the tank being sampled has been completed. (AC 5.7)</td>
<td>FWS Signature</td>
</tr>
<tr>
<td><strong>VERIFY</strong> Core Sampling System has been set-up on tank per TO-020-451 and appropriate sign-offs and prerequisites are complete.</td>
<td>FWS Signature</td>
</tr>
<tr>
<td><strong>VERIFY</strong> that the core sampler drill string seal is in place to minimize exposure pathway (ALARACT 02.3)</td>
<td>FWS Signature</td>
</tr>
<tr>
<td><strong>VERIFY</strong> that threaded drill string connections and/or shielded receiver and sampler camlocks are secured as necessary to minimize exposure pathway</td>
<td>FWS Signature</td>
</tr>
<tr>
<td><strong>VERIFY</strong> that two eyewash stations with drench hoses are staged at the worksite.</td>
<td>FWS Signature</td>
</tr>
</tbody>
</table>

Checklist 1 **Continued on Next Page**
The following conditions must be signed off as complete prior to starting this procedure.

<table>
<thead>
<tr>
<th>TANK#</th>
<th>SAMPLE RISER#</th>
<th>CORE#</th>
<th>WORK PACKAGE</th>
</tr>
</thead>
</table>

**SIGNATURE/DATE**

DATE COLLECTED:______________

BATCH NUMBER:_____________________

_________________________________ / ______________ / __________

FWS Signature                  Print                  Date

**IF** required, **ENSURE** LiBr sample is provided to lab.

IF second batch is used during sampling, **INDICATE** below.

DATE COLLECTED:______________

BATCH NUMBER:_____________________

_________________________________ / ______________ / __________

FWS Signature                  Print                  Date

Checklist 1 **Continued on Next Page**
## Checklist 1 – Prerequisite Conditions and Signoffs (Cont.)

### Sheet 3 of 3

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<thead>
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<th>TANK#</th>
<th>SAMPLE RISER#</th>
<th>CORE#</th>
<th>WORK PACKAGE</th>
<th>SIGNATURE/DATE</th>
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<tbody>
<tr>
<td><strong>STEP</strong></td>
<td><strong>The following conditions must be signed off as complete during the performance of this procedure.</strong></td>
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<tr>
<td>5.3.3.1</td>
<td><strong>RECORD</strong> torque wrench calibration data.</td>
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<td>Torque Wrench Serial Number:</td>
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<td>Torque Wrench Calibration Due Date:</td>
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<td>FWS Signature</td>
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<tr>
<td>5.3.3.4</td>
<td><strong>ENSURE</strong> the mounting screw on the lifting bail is/has been torqued as indicated on the lifting bail (+25% -0%).</td>
<td>Required Torque Value: ft-lbs.</td>
<td>Actual Torque Value: ft-lbs.</td>
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<td>FWS Signature</td>
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<tr>
<td>5.3.4</td>
<td><strong>CONFIRM</strong> the drill bit, core barrel, QR and DS are the same as identified on the DS calculation sheet from TO-020-451.</td>
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<td>FWS Signature</td>
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<tr>
<td>5.3.5</td>
<td><strong>INDEPENDENTLY VERIFY</strong> Step 5.3.4.</td>
<td>Operator Signature</td>
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</table>
### Core Sampling System Push Mode Operations

#### Checklist 2 – FWS Checklist

<table>
<thead>
<tr>
<th>TANK#</th>
<th>SAMPLE RISER#</th>
<th>CORE#</th>
<th>WORK PACKAGE #</th>
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</thead>
</table>

FWS PERFORM the following: (CHECK ✓ EACH ITEM WHEN COMPLETE.)

**DATE:**

**SHIFT:**

**INITIAL:**

**VERIFY** active ventilation system is running and **CONFIRM** negative pressure on tank (e.g. magnehelic, pressure watch). **MARK N/A** if not actively ventilated. (ALARACT 02.3.2j)

**CONFIRM** passive ventilation system is operational on tank being sampled. **MARK N/A** if actively ventilated. (ALARACT 02.3)

**IF** exhauster is not operational, **VERIFY** that purge gas flow is < 10 cfm.

**RECORD** DRI Survey Form number.
### TANK#  SAMPLE RISER#  CORE#  WORK PACKAGE

**Core Sampling System Push Mode Operations**

#### Data Sheet 1 – Core Sampling Information

<table>
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<tr>
<th>SAMPLE #(core-seg)</th>
<th>DS LENGTH</th>
<th>MAXIMUM PUSH DOWN FORCE</th>
<th>EXPECTED WASTE CHARACTERISTICS</th>
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</thead>
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<td>lbs</td>
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</table>

Engineer **COMPLETE** data below and deliver to operations prior to sampling. **COMPLETE** additions or changes in the field for partial segments and **RECORD** with initials and date.

Completed by: 

Completed by: 

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<th>Signature</th>
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<th>Date</th>
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</thead>
</table>

Amount of LiBr added for each segment: 

Amount Checked by: 

Amount Checked by: 

<table>
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<tr>
<th>Signature</th>
<th>Print</th>
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</table>

Expected initial reading of grapple: 

Expected initial reading of RLU: 

Sample/Grapple Wash Volume: 

Sample/Grapple Wash Volume: 

<table>
<thead>
<tr>
<th>Expected initial reading of grapple:</th>
<th>Expected initial reading of RLU:</th>
<th>Sample/Grapple Wash Volume:</th>
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</thead>
<tbody>
<tr>
<td>+ &quot;ZERO&quot; VALUE</td>
<td>+ &quot;ZERO&quot; VALUE</td>
<td>gal.</td>
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</table>

Expected initial reading of grapple: 

Expected initial reading of RLU: 

Sample/Grapple Wash Volume: 

Sample/Grapple Wash Volume: 

Completed: 

Completed: 

<table>
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<tr>
<th>Date</th>
<th>Amount</th>
<th>Date</th>
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Completed by: 

Completed by: 

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**Completed** additions or changes in the field for partial segments and **RECORD** with initials and date.

Completed: 

Completed: 

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**Completed** additions or changes in the field for partial segments and **RECORD** with initials and date.

Completed: 

Completed: 

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<th>Date</th>
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## Data Sheet 2 – Drill String Replacement

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<th>CORE#</th>
<th>WORK PACKAGE</th>
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</thead>
<tbody>
<tr>
<td>Length</td>
<td># of Item Removed</td>
<td>New #, (N/A if item to be reused)</td>
<td>Sign/Date</td>
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## Data Sheet 3 – Sampling Data

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<td>Step</td>
<td>Description</td>
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<td>5.3.1</td>
<td>SAMPLE/SAMPLER DATA</td>
<td>Sample #</td>
<td>Cask #</td>
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<td>OR</td>
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<td>5.4.1</td>
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<td>Sampler #</td>
<td>O-ring</td>
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<tr>
<td>5.12.4</td>
<td>EXPECTED RLU READING AT BOTTOM (copy from Step 5.8.7 for previous segment)</td>
<td></td>
<td>inches</td>
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<tr>
<td>5.12.7</td>
<td>RLU READING AT BOTTOM when lowering sampler</td>
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<td>inches</td>
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<tr>
<td>5.5.5</td>
<td>GPL COUNTER READOUT AT SLACK CABLE (19” more for 19” stroke)</td>
<td>rev</td>
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</tr>
<tr>
<td>5.6.2</td>
<td>DOWN FORCE (lbs)</td>
<td>STROKE (inches)</td>
<td>lbs</td>
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<tr>
<td></td>
<td>OPERATOR INITIALS</td>
<td>Operator</td>
<td></td>
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<td></td>
<td>PENETRATION RATE (ipm)</td>
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<td>5.7.1</td>
<td>GRAPPLE AND LOAD CELL DATA</td>
<td>time</td>
<td>date</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>shear</td>
<td>drop</td>
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<td>5.7.9</td>
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<tr>
<td>5.8.4/5.8.5</td>
<td>EXPECTED RLU READING AT BOTTOM WHEN UNSEATING (Step 5.12.7 + 19” if 19” rod added)</td>
<td></td>
<td>inches</td>
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<td>5.8.7</td>
<td>RLU READING AT BOTTOM WHEN UNSEATING</td>
<td></td>
<td>inches</td>
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<td>5.8.10</td>
<td>MAX FORCE TO UNSEAT SAMPLER</td>
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<td></td>
<td></td>
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<td>5.8.11</td>
<td>CONTACT DOSE RATE THROUGH DS</td>
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Field Notes:

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Type: CONTINUOUS  
Document No.: TO-080-503  
Rev/Mod: N-3  
Release Date: 06/05/2018  
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Data Sheet 4 – Certification Hold Points

(HP) HOLD POINT

Step 5.13.45.2  PERFORM initial certification of glovebag in accordance with Glovebag Certification Checklist.

____________________ / ______________________ / ______________________
Signature              Print (First and Last)   Date

(HP) HOLD POINT

Step 5.13.45.3b  PERFORM additional certification of glovebag in accordance with Glovebag Certification Checklist.

____________________ / ______________________ / ______________________
Signature              Print (First and Last)   Date

(HP) HOLD POINT

Step 5.13.45.3b  PERFORM additional certification of glovebag in accordance with Glovebag Certification Checklist.

____________________ / ______________________ / ______________________
Signature              Print (First and Last)   Date
Attachment 1 – Remote Latch Unit (RLU) Pre-Installation Fluid Level Check

Push the RLU down on to a quadralatch. Push on the top clevis until it stops moving to get it to the RELEASE position. As shown in the Figure, the space between the clevis and the shell has to be at least as big as the shank of a #16 drill. If not, fluid should be added, per TO-020-004.
### Attachment 2 - Core Sampling System Alarm Response

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drill Down Force High</td>
<td><strong>ACKNOWLEDGE</strong> alarm. <strong>ADJUST HS-009 DRILL DOWN FORCE CONTROL</strong> to limit down force for this segment per Data Sheet 1 – Core Sampling Information.</td>
</tr>
<tr>
<td>Shielded Receiver Overload</td>
<td>No response required</td>
</tr>
<tr>
<td>Enclosure AC Fault</td>
<td><strong>ACKNOWLEDGE</strong> alarm. <strong>SHUTDOWN</strong> drill platform.</td>
</tr>
</tbody>
</table>